

CLAIMS

What is claimed is:

1. A liquid ring pump comprising:
 - (a) a housing; and
 - (b) a rotor rotatably mounted eccentrically within the housing, the rotor comprising:
 - (i) an annular inner surface having a plurality of radial apertures therein;
 - (ii) a plurality of spaced blades interspersed between the plurality of radial apertures, the blades projecting radially outward from the annular inner surface; and
 - (iii) at least a pair of side walls spaced apart axially along the annular inner surface with one side wall on each axial side of the radial apertures, the side walls projecting outwardly from the annular inner surface and extending between the spaced blades to form a plurality of radially extending chambers;wherein gas enters and leaves the chambers through the radial apertures during operation.
2. The liquid ring pump of claim 1, further comprising port means for supplying gas to and receiving gas from the chambers through the apertures of the annular rotor.
3. The liquid ring pump of claim 1, further comprising
 - (a) an intake port positioned radially inward of the annular rotor for directing gas to the compression chambers; and

(b) a discharge port positioned radially inward of the annular rotor surface for receiving gas discharged from the compression chambers, the discharge port being angularly spaced from the intake port.

4. The liquid ring pump of claim 1 wherein one blade is positioned between each adjacent pairs of radial apertures.

5. The liquid ring pump of claim 1 wherein one side wall is positioned on each side of the radial apertures.

6. The liquid ring pump of claim 1, further comprising means for routing the liquid from a first location within the housing at which the liquid is subjected to a first pressure during operation to a contact surface between moving parts of the liquid ring pump, the contact surface being at a second location at a second pressure less than the first pressure during operation.

7. The liquid ring pump of claim 1, further comprising:

(a) an aperture positioned on an outer surface of a contact journal of the liquid ring pump; and

(b) a channel positioned radially inward of the contact journal for providing liquid to the aperture.

8. The liquid ring pump of claim 7, further comprising a connection between the housing and the channel for providing liquid in the liquid ring to the contact journal during operation.

9. The liquid ring pump of claim 1 wherein the housing is configured to rotate about an axis parallel to an axis of the rotor, the housing having a plurality of inwardly extending elements adapted to cause the liquid in the liquid ring pump to rotate when the rotatable ring is rotated.

10. The liquid ring pump of claim 9, further comprising an actuator, the actuator being magnetically couplable to the housing to controllably rotate the liquid.

11. The liquid ring pump of claim 1 wherein the housing comprises a rotatable ring configured to rotate about an axis parallel to an axis of the rotor, the rotatable ring having a plurality of inwardly extending elements adapted to cause the liquid in the liquid ring pump to rotate when the rotatable ring is rotated.

12. The liquid ring pump of claim 11, further comprising an actuator, the actuator being magnetically couplable to the rotatable ring to controllably rotate the liquid.

13. The liquid ring pump of claim 1 wherein the housing comprises a rotatable ring configured to rotate about an axis parallel to an axis of the rotor, the rotatable ring having means to cause the liquid in the liquid ring pump to rotate when the rotatable ring is rotated.

14. The liquid ring pump of claim 13, further comprising an actuator, the actuator being magnetically couplable to the rotatable ring to controllably rotate the liquid.

15. A rotor for being rotatably mounted eccentrically within a housing on a liquid ring pump, the rotor comprising:

- (a) an annular inner surface having a plurality of radial apertures therein;
- (b) a plurality of spaced blades interspersed between the plurality of radial apertures, the blades projecting radially outward from the annular inner surface; and
- (c) at least a pair of side walls spaced apart axially along the annular inner surface with one side wall on each axial side of the radial apertures, the side walls projecting outwardly from the annular inner surface and extending between the spaced blades to form a plurality of radially extending chambers.

16. A rotor for being rotatably mounted eccentrically within a housing on a liquid ring pump, the rotor comprising:

- (a) an annular inner surface having a plurality of radial apertures therein; and
- (b) a plurality of walled cells projecting radially outward from the annular inner surface, a wall on each of the walled cells extending around at least one of the radial apertures.

17. A liquid pump comprising:

- (a) a housing having a rotatable ring configured to rotate about a rotary axis, the rotatable ring having a plurality of inwardly

extending elements adapted to cause a liquid in the liquid ring pump to rotate when the rotatable ring is rotated;

(b) a rotor mounted within the housing to rotate at least partially within the rotatable ring about an axis parallel with the rotary axis, the rotor being eccentrically positioned within the housing, the rotor comprising:

- (i) an annular inner surface having a plurality of radial apertures therein;
- (ii) a plurality of spaced blades interspersed between the plurality of radial apertures, the blades projecting radially outward from the annular inner surface; and
- (iii) at least a pair of side walls spaced apart axially along the annular inner surface with one side wall on each axial side of the radial apertures, the side walls projecting outwardly from the annular inner surface and extending between the spaced blades to form a plurality of radially extending chambers;

and

(c) an actuator, the actuator being magnetically couplable to the rotatable ring to controllably rotate the liquid.

18. A liquid ring pump comprising:

- (a) a housing;
- (b) a rotor rotatably mounted eccentrically within the housing, the rotor being configured to cause the liquid to rotate within the housing during operation, and
- (c) means for routing the liquid from a first location within the housing to a contact surface between two moving parts of the liquid ring pump, the first location being at a first pressure during

operation, the contact surface being at a second pressure during operation, the second pressure being less than the first pressure.

19. The liquid ring pump of claim 18 wherein the housing comprises a rotatable ring configured to rotate about an axis parallel to an axis of the rotor, the rotatable ring having means to cause the liquid in the liquid ring pump to rotate when the rotatable ring is rotated.

20. The liquid ring pump of claim 19, further comprising an actuator, the actuator being magnetically couplable to the rotatable ring to controllably rotate the liquid.

21. A method for operating a liquid ring pump, comprising:

- (a) rotating a rotor eccentrically mounted within a housing to cause the liquid to flow circumferentially around an interior of the housing; and
- (b) directing a portion of the liquid from an area within the housing subject to a relatively high pressure to an area within the housing subject to a relatively low pressure, the liquid flowing between at least two adjacent parts to facilitate relative movement between the two parts.